WE CLAIM:

1. A LC display comprising a plurality of cells having well-defined size, shape and aspect ratio, said cells filled with a liquid crystal composition.

2. The LC display of Claim 1 wherein the cells are substantially uniform in size and shape.

3. The LC display of Claim 1 wherein the cells are non-spherical.

4. The LC display of Claim 1 wherein the cells are formed from microcups with an opening area ranging from about 0.04 to about 100 μm^2.

5. The LC display of Claim 4 wherein the cells are formed from microcups with an opening area ranging from about 1 to about 25 μm^2.

6. The LC display of Claim 1 wherein the cells are formed from microcups with an opening having a circular, polygonal, hexagonal, rectangular or square shape.

7. The LC display of Claim 1 wherein the cells have a depth in the range from about 0.5 to about 10 microns.

8. The LC display of Claim 7 wherein the cells have a depth in the range from about 2 to about 6 microns.

9. The LC display of Claim 1 wherein the cells have an opening to wall ratio in the range from about 0.05 to about 20.

10. The LC display of Claim 9 wherein the cells have an opening to wall ratio in the range from about 0.2 to about 9.

11. The LC display of Claim 1 wherein selected cells in a pre-determined area are filled with LC with guest dye(s) of a predetermined color.

12. The LC display of Claim 11 wherein cells which are filled with LC with guest dye(s) of a predetermined color are adjacent to each other.

13. The LC display of Claim 11 wherein cells which are filled with LC with guest dye(s) of a predetermined color are stacked on top of each other.

14. A process for the preparation of well-defined cells of substantially uniform size and shape to be used in a LC display, which process comprises the steps of:

a) coating a layer of thermoplastic or thermoset precursor on a conductor film;

b) embossing the thermoplastic or thermoset precursor layer with a pre-patterned male mold;

c) releasing the mold from the thermoplastic or thermoset precursor layer;

d) hardening the thermoplastic or thermoset precursor layer; and

e) filling the thus-formed array of microcups with LC..

15. The process of Claim 14 wherein said thermoset precursor is selected from the group consisting of polyvalent acrylate or methacrylate, polyvalent vinyl including vinylbenzene, vinylsilane, vinylether, polyvalent epoxide, polyvalent allyl, and oligomers, polymers containing crosslinkable functional groups, and the like.

16. The process of Claim 14 wherein the thermoplastic or thermoset precursor layer is embossed at a temperature near or above its glass transition temperature.

17. The process of Claim 16 wherein the glass transition temperature ranges from about -70°C to about 150°C.

18 The process of Claim 16 wherein the glass transition temperature ranges from about -20°C to about 100°C.

19. The process of Claim 14 wherein the hardening of the thermoset precursor layer is accomplished by cross-linking by radiation, heat, moisture, cooling or evaporation of a solvent or plasticizer.

20. The process of Claim 14 wherein the hardening of the thermoset precursor layer is accomplished by UV, visible light, near IR, or electron beam radiation.

21. The process of Claim 14 wherein the pre-patterned male mold is released before, during or after the thermoplastic or thermoset precursor layer is hardened.

22. A process for the preparation of well-defined cells of substantially uniform size and shape to be used in a LC display, which process comprises the steps of:

a) coating a layer of radiation curable composition on a conductor film;

b) imagewise exposing the radiation curable layer;

c) removing the unexposed areas by a developer or solvent to reveal an array of microcups; and

d) filling the microcups with LC preferably with a guest dye.

23. The process of Claim 22 wherein said radiation curable composition comprises materials selected from the group consisting of polyvalent acrylate or methacrylate, polyvalent vinyl including vinylbenzene, vinylsilane, vinylether, polyvalent epoxide, polyvalent allyl, oligomers or polymers containing crosslinkable functional groups, and the like.

24. The process of Claim 22 wherein the imagewise exposure is accomplished by UV, visible light, near IR, or electron beam radiation.

25. A process for the preparation of an array of well-defined cells used in a LC display, which process comprises the steps of:

a) filling the microcups with a liquid crystal composition , preferably with guest dye(s) and a dispersion of thermoset or thermoplastic precursor composition which has a specific gravity lower than that of the LC; and

b) sealing the microcups by hardening the thermoset or thermoplastic precursor composition during or after it phase separates and forms a supernatant layer above the LC.

26. The process of Claim 25 wherein the thermoset or thermoplastic precursor composition comprises materials selected from the group consisting of acrylates or methacrylates, vinyls, polyvalent acrylates or methacrylates, cyanoacrylates, polyvalent vinyls including vinylbenzene, vinylsilane, vinylether, polyvalent epoxides, polyvalent isocyanates, polyvalent allyls, and oligomers or polymers derived from them preferably those containing crosslinkable functional groups, and the like.

27. A process for the preparation of well-defined cells used in a LC display, which process comprises the steps of:

a) filling the microcups with a LC composition,

b) sealing the microcups by overcoating onto the said LC filled microcups a thermoset or thermoplastic precursor composition which is at least partially immiscible with said LC and has a specific gravity lower than that of said LC, and

c) hardening said thermoplastic or thermoset precursor composition.

28. The process of Claim 27 wherein the thermoplastic or thermoset precursor composition is diluted with a volatile solvent or solvent mixture which is evaporated after said composition is coated onto the LC.

29. The process of Claim 27 wherein the overcoated thermoset precursor composition is cured by radiation, heat, moisture, or interfacial reactions at the interface between the overcoat and the LC.

30. The process of Claim 27 wherein the thermoplastic or thermoset precursor composition comprises materials selected from the group consisting of acrylates or methacrylates, vinyls, polyvalent acrylates or methacrylates, cyanoacrylates, polyvalent vinyls including vinyl benzene, vinylsilanes, vinyl ethers, polyvalent epoxides, polyvalent isocyanates, polyvalent allyls, oligomers or polymers derived from them preferably those containing crosslinkable functional groups, and the like.

31. A process for the manufacture of a LC display, which process comprises the steps of:

a) preparing microcups by first coating a layer of thermoplastic or thermoset precursor on a conductor film followed by embossing the thermoplastic or thermoset precursor layer with a male mold or by imagewise exposing the thermoset precursor layer and removing the unexposed areas;

b) filling in the thus-formed array of microcups with LC;

c) sealing the microcups; and

d) laminating the sealed array of LC cells with a second conductor film preferably pre-coated with an adhesive layer.

32. The process of Claim 31 wherein the adhesive layer is hardenable or crosslinkable by heat, moisture or radiation, and is cured during or after lamination.

33. A process for the manufacture of a multi-color LC display, which process comprises the steps of:

a) preparing microcups by first coating a layer of thermoplastic or thermoset precursor on a conductor film followed by embossing the thermoplastic or thermoset precursor layer with a male mode or by imagewise exposing the thermoset precursor layer and removing the unexposed areas;

b) laminating the thus formed array of microcups with a layer of positive photoresist;

c) imagewise exposing the positive photoresist to selectively open the microcups in a predetermined area;

d) filling in the opened microcups with LC with guest dye(s) of the first color;

e) sealing the microcups to form closed LC with guest dye(s) of the first color;

f) repeating Steps c) to e), if necessary, in different areas to generate groups of microcups containing LC fluid of different colors;

g) removing residual positive photoresist, if any; and

h) laminating the sealed array of LC cells with a second transparent conductor film precoated with an adhesive layer.

34. The process of Claim 31 wherein the sealing of the microcups is accomplished by filling the microcups with LC preferably with guest dye(s) and a dispersion of thermoplastic or thermoset precursor composition which has a specific gravity lower than that of the LC, followed by hardening the thermoset precursor composition during or after it phase separates and forms a supernatant layer above the dielectric solvent or solvent mixture.

35. The process of Claim 33 wherein the sealing of the microcups is accomplished by filling the microcups with LC preferably with guest dye(s) and a dispersion of thermoplastic or thermoset precursor composition which has a specific gravity lower than that of the LC, followed by hardening the thermoplastic or thermoset precursor composition during or after it phase separates and forms a supernatant layer above the LC.

36. The process of Claim 31 wherein the sealing of the filled microcups is accomplished by overcoating onto the said LC a thermoplastic or thermoset precursor composition which is at least partially immiscible with said LC and has a specific gravity lower than that of said LC, followed by hardening the said thermoplastic or thermoset precursor composition.

37. The process of Claim 33 wherein the sealing of the filled microcups is accomplished by overcoating onto the said _LC a thermoplastic or thermoset precursor composition which is at least partially immiscible with said LC and has a specific gravity lower than that of said LC, followed by hardening the said thermoplastic or thermoset precursor composition.

38. The process of Claim 31 wherein an adhesive layer is precoated on the positive photoresist and laminated onto the array of microcups.

39. The process of Claim 33 wherein an adhesive layer is precoated on the positive photoresist and laminated onto the array of microcups.

40. The process of Claim 38 wherein said adhesive is developable by the developer of the positive photoresist.

41. The process of Claim 39 wherein said adhesive is developable by the developer of the positive photoresist.

42. The process of Claim 33 wherein color filters preferably red, green, and blue color filters are laminated or coated onto the display.

43. The LC display of Claim 1 wherein LC is colored by a guest dye.

44. The LC display of Claim 43 wherein the guest dye color is a subtractive or additive color system.

45. The LC display of Claim 1 wherein the display comprises more than one layer of microcup array filled with liquid crystal composition.

46 The LC display of Claim 1 wherein said LC display is multi-color and wherin color filters preferably red, green, and blue color filters are laminated or coated onto the display.